Biodiversity Impact Assessment for the proposed Mbavuza Quarry Mining Aggregates Quarrying in the Qiko Area, KwaZulu-Natal

KWAQIKO, KWAZULU-NATAL

CLIENT: MBAVUZA MINING (PTY) LTD

15 AUGUST 2025

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Prepared For:	**Mbavuza Mining (Pty) Ltd** E-mail:
Prepared By:	Ndumiso Dlamini Ecologist Email: info@9zeroseven.com

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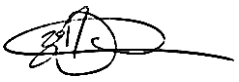
Declaration

I Ndumiso Ian Dlamini, as duly authorised representative of 9ZeroSeven Environmental, hereby confirm my independence and declare that I:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Signature of the specialist:	
Designation:	Ecologist (Pr. Sci. Nat.)
Qualifications:	BSc Life and Environmental Sciences (UJ) BSc Hons Botany (UJ)
Experience (years):	Ten (10)
Date:	15 August 2025

1 Introduction

9ZeroSeven (907) Environmental was commissioned to conduct an Ecological assessment for a proposed development of the Mbavuza Quarry in the Qiko area. The assessment is to support of the Mining Permit Application for the mining on the farm Qiko 17447 ET within the magisterial district of Umzinto, KwaZulu-Natal Province.

This report presents the results of an Ecological assessment completed for the proposed Prospecting Right Application. This report should be interpreted after taking into consideration the findings and recommendations provided by the specialist herein. Further, this report should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Aim and objectives

As part of this assessment, the following objectives were established:

- The identification of habitat areas through a desktop assessment;
- The identification of habitat, vegetation and fauna with the project area;
- Conduct an impact assessment for the proposed development;
- The prescription of mitigation measures and recommendations for identified impacts / risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Explanation of certain documents or organisations is provided where these have a high degree of relevance to the project and/or are referred to in this assessment.

2.1 International Legislation and Policy

- Convention on Biological Diversity (Rio de Janeiro, 1992);
- The Ramsar Convention (on wetlands of international importance);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival; and
- The IUCN (World Conservation Union). The IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable

2.2 National Legislation

- Constitution of the Republic of South Africa (Act 108 of 1996). The Bill of Rights, in the Constitution of South Africa states that everyone has a right to a nonthreatening environment and requires that reasonable measures be applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development;
- The National Environmental Management Act (NEMA) No. 107 of 1198): Ecological Assessment Regulations, 2014. Specifically, the requirements of the specialist report as per the requirements of Appendix 6;
- The National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity;
- National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations;
- National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003);
- National Water Act, 1998 (Act 36 of 1998);
- Environmental Conservation Act, 1989 (ECA), (Act no. 73 of 1989);
- National Forests Act, 1998 (Act 84 of 1998), specifically with reference to Protected Tree species;
- National Heritage Resources Act, 1999 (Act 25 of 1999);
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

2.3 National Policy and Guidelines

- South Africa's National Biodiversity Strategy and Action Plan (NBSAP);
- National Spatial Ecological Assessment (NSBA); and
- National Freshwater Ecosystem Priority Areas (NFEPA's)
- National Biodiversity Assessment (NBA) (2018).

2.4 Provincial and Municipal Level

In addition to national legislation, South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

- KwaZulu-Natal Biodiversity Spatial Plan (2016).

2.5 Structure of the Report

Aspect	Section
The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process.	Section 5
A declaration that the person is independent	Page viii
An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 4
A description of any assumptions made and any uncertainties or gaps in knowledge	Section 5
(f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 8
Recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	Section 9
A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies of any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A

3 Description of the Project Area

The project area is located on the farm Qiko 17447 ET within the Qiko area in the KwaZulu-Natal Province as presented in Figure 3-1. The project area is located in proximity to the uMkomazi River. The project area is located approximately 40km north-west of Richmond and 20km south-east of Scottburgh.

The proposed project is situated in the quaternary catchment U10M within the Pongola-Mtamvuna Water Management Area (WMA 4). It is noted that the Mvoti-Umzimkhulu WMA was reclassified into the larger Pongola-Mtamvuna Water Management Area (WMA 4) (NWA, 2016). The project area lies in the North-Eastern Coastal Belt Ecoregion.

The portion of the WMA lies predominantly along the eastern coast of South Africa, mainly within the province of KwaZulu-Natal, and borders on Lesotho to the west. The region has a mean annual precipitation rate of 800 to 1 500 mm and is considered humid. The terrain is characterised with rolling hills with the Drakensburg escarpment as the main topographic feature. The area is characterised as rural, and activities include subsistence and commercial farming (StatsSA, 2010).

The land uses within the local area is predominantly low-density rural housing and gravel road networks.

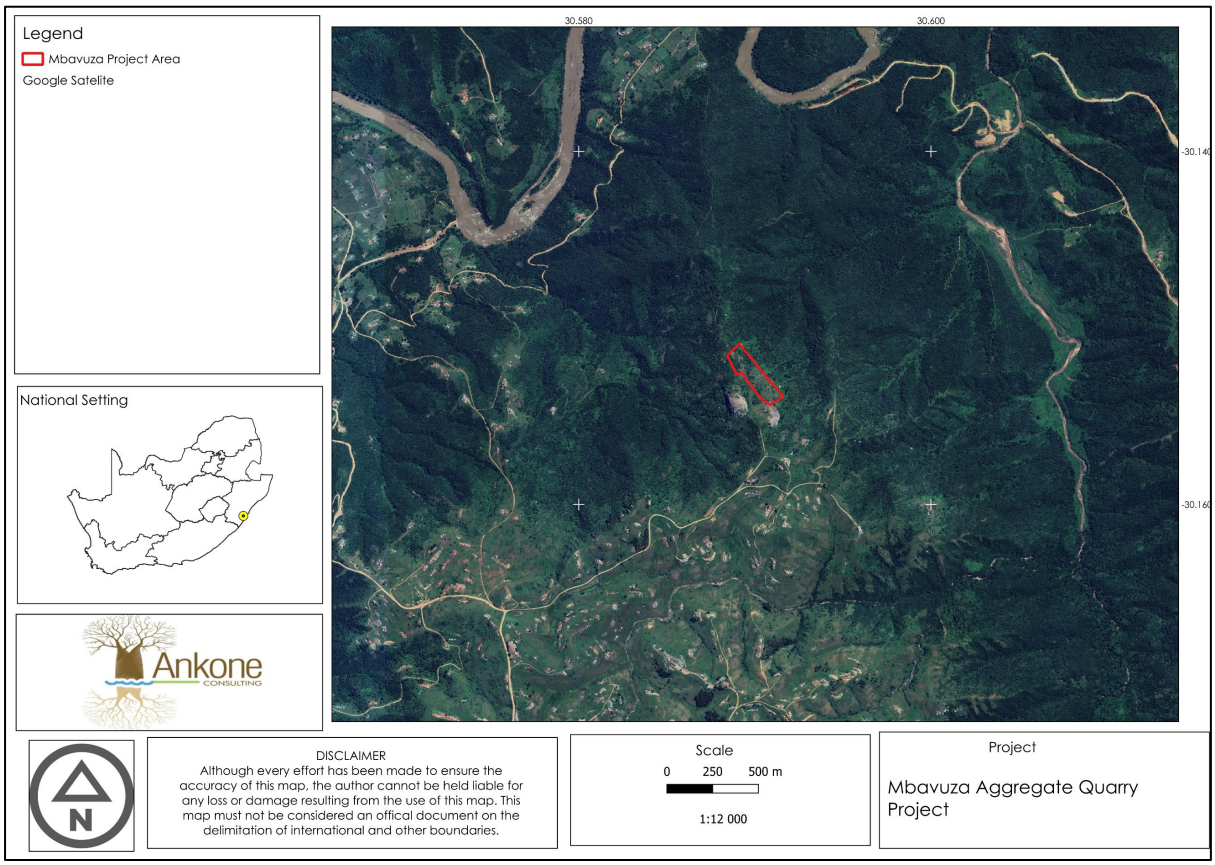


Figure 3-1: Location of the Project Area

3.1 Climate

The area is characterised by summer rainfall climate with an overall Mean Annual Precipitation (MAP) of 510mm – 1000mm. Frost is not frequent throughout the area. The climate diagram for the area is presented in Figure 3-2.

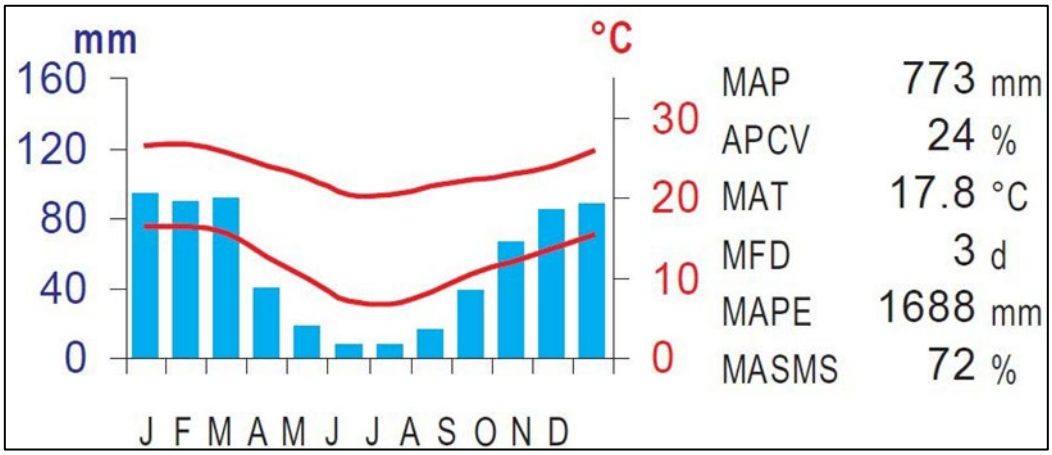


Figure 3-2: Climate diagram (Mucina and Rutherford, 2006)

4 Approach

A desktop study was undertaken, aiming to identify:

- Potential species in the site area according to the South African National Biodiversity Institute (SANBI);
- Potential Red Data species and their current status; and
- Expected vegetation type and community structure, (Mucina and Rutherford 2006).

4.1 Site Visit

The project area was systematically traversed on foot and by vehicle (Figure 4-1) to identify and assess the general habitat types present throughout the investigation area. The site is characterized by rocky, steep terrain, with large boulder outcrops (Figure 4-2) that significantly limited accessibility to portions of the proposed development footprint. These physical features influenced both the extent of the field survey and the distribution of habitats across the site.

Figure 4-1: The specialist survey tracks for the Mbavuza project

Figure 4-2: Boulder and steep terrain

4.2 Flora

Prior to the field visit, a record of floral SCC and their habitat requirements was acquired from SANBI for the Quarter Degree Square in which the investigation area is situated, as well as relevant regional, provincial and national lists. Throughout the floral assessment, special attention was paid to the identification of any of these SCC as

well as the identification of suitable habitat that could potentially support these species.

4.2.1 Species List

The species list was compiled from both the description of the vegetation type of the study area supplied by Mucina and Rutherford (2006) as well as the South African National Biodiversity Institute National Herbarium Pretoria Computerised Information System (SANBI PRECIS) list. Lists of expected faunal species were drawn up from several different sources and the IUCN Red Data species likely to be found on site determined. Lists were drawn up for mammals, birds, reptiles, amphibians and invertebrates. The full list of expected species can be found in the appendices.

4.3 Fauna

The following lists and databases were consulted to complete the fauna desktop assessment, prior to the field visit:

- The SIBIS online interactive species distribution map was used to obtain data for the distribution of mammals, reptiles, amphibians and terrestrial invertebrates within the greater study area. Data was acquired for the Quarter Degree Squares (QDS) in which the study is located;
- The potential occurrence of mammals was supplemented by the species distribution maps in Friedman and Daly (2004), and Smithers (2002);
- Lists of birds found in the Quarter Degree Square (QDS) for the study area were determined using online data from the South African Bird Atlas Project (SABAP 2) for 2012;
- The Convention on International Trade of Endangered Species (CITES) species database;
- The IUCN Red-Data List for South African fauna;
- The International IUCN Red-Data List, and;
- National Environmental Management Biodiversity Act (NEMBA 10 of 2004) listed species.

4.3.1 Faunal Assessment Methodology

Special emphasis was placed on areas that may potentially support faunal SCC. Sites were investigated on foot in order to identify the occurrence of the dominant faunal communities, species and habitat diversities. The presence of any faunal inhabitants of the investigation area was also assessed through direct visual observation or identifying such species through calls, tracks, scats and burrows.

It is important to note that faunal species have varied life cycles, breeding patterns, and are subject to seasonal fluctuations. As such, it is unlikely that all faunal species will have been recorded during the site assessment. However, even though some faunal species may not have been identified during the sight assessment, the habitat units and degree of transformation can be used to establish an accurate

understanding of faunal assemblages most likely associated with the investigation area.

4.4 Sensitivity Mapping

All the ecological features associated with the proposed infrastructure areas were considered and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition, if any SCC and SANBI protected species were observed, their position was also marked by means of GPS. A Geographic Information System (GIS) was used to project these features onto aerial photographs and topographic maps.

There are several assessments for South Africa as a whole, as well as on provincial levels that allow for detailed conservation planning as well as meeting biodiversity targets for the country's variety of ecosystems. These guides are essential to consult for development projects, and will form an important part of the sensitivity analysis. Areas earmarked for conservation in the future, or that are essential to meet biodiversity and conservation targets should not be developed, and have a high sensitivity as they are necessary for overall functioning. In addition, sensitivity analysis in the field based in much finer scale data can be used to ground-truth the larger scale assessments and put it into a more localised context.

The following assessments and assignations were taken into account in determining sensitivity:

- The occurrence of the site within an Internationally recognised Important Bird Area (IBA);
- The National List of Ecosystems that are Threatened and in need of Protection;
- The National Protected Areas Expansion Strategy;
- The National Spatial Biodiversity Assessment and the National Vegetation Map (Mucina and Rutherford, 2006).

The Sensitivity Assessment was conducted based on desktop studies as well as information obtained during the field investigations. Ecological sensitivity was quantified by subjectively assessing two factors, namely ecological function and conservation importance. These were defined as follows:

4.5 Ecological function

Ecological function is rated as described below:

- High ecological function: Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystem integrity (e.g. pristine grasslands, pristine wetlands and pristine ridges);
- Medium ecological function: Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem; and

- Low ecological function: Degraded and highly disturbed systems with little or no ecological function.

Functional Status refers to an indication of the services provided by an area and includes both ecological and human related services. Functional Status depends on the degree to which the area or system still provides a noticeable service.

4.6 Buffer Determination

A buffer zone is defined as "A strip of land with a use, function or zoning specifically designed to protect one area of land against impacts from another." (Macfarlane, et al., 2014).The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane, et al., 2014) was used to determine the appropriate buffer zone for the proposed activity. This guideline was designed to assist in the determination of the appropriate buffer zones for water resources. The assessment procedure can be seen in Figure 4-3.

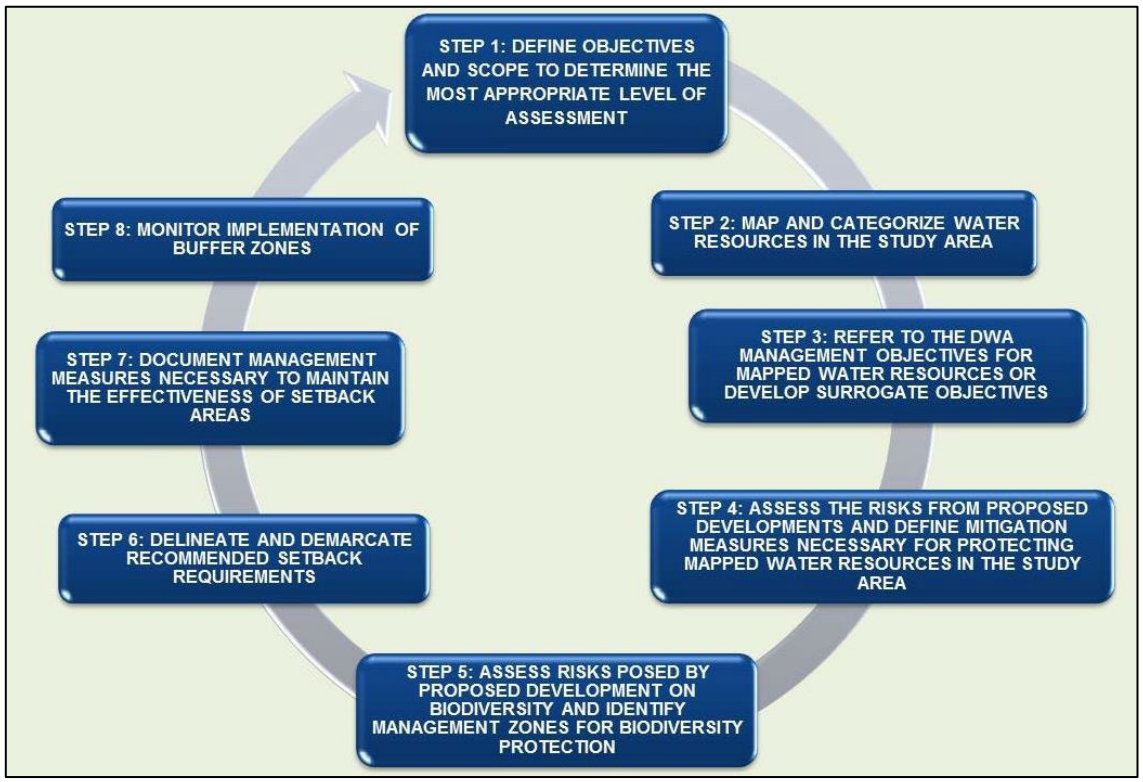


Figure 4-3: The assessment for the determination of the appropriate buffer zone follows this procedure

4.7 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork to identify relevance to the study area. The relevant impacts were then subjected to a prescribed impact assessment methodology which is described below. Mitigation measures were only applied to impacts deemed relevant on the basis of the impact analysis. The likelihood and consequence descriptors are presented inTable 4-1 and Table 4-2. The significance rating matrix is presented in Table 4-4.

Table 4-1: Likelihood descriptors

Probability of impact	**RATING**
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
Sensitivity of receiving environment	**RATING**
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 4-2: Consequence descriptors

Severity of impact	**RATING**
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**RATING**
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Severity of impact	**RATING**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 4-3: Significance Rating Matrix

	CONSEQUENCE (Severity + Spatial Scope + Duration)														
LIKELIH O O	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	2	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**

	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

4.7.1 Level of Significance

Based on the above criteria, the significance of issues will be determined using the following formula:

Significance = Consequence × Probability

The significance of the impact is rated as follows:

Table 4-4: Impact Assessment Significant Rating

Description	Explanation	Scoring
No Impact	There is no impact	0 – 10
Low	Impacts are less important. Some mitigation is required to reduce the negative impacts.	11 – 30
Medium	Impacts are important and require attention. Mitigation is required to reduce the negative impacts.	31 – 60
High	Impacts are of high importance. Mitigation is essential to reduce the negative impacts.	61 – 89
Fatal Flaw	Impacts present a fatal flaw, and alternatives must be considered	90 – 100

5 Limitations and Assumptions

The following assumptions and limitations are applicable to this report:

- The study is limited to the boundary of the project area;
- Access to the site was limited and as such the ground-truthing and investigation could not traverse the entire project area, as much of the area as possible was assessed;
- Ground truthing was performed to verify on-site conditions and identify key areas for consideration;
- All delineations are based on aerial imagery; and
- The lack of information regarding the activities to be completed on the site, only allowed for a general assessment on the impacts and the buffer requirement

6 Expertise of the Specialist

Ndumiso Dlamini obtained his BSc (Hons) degree in Botany from the University of Johannesburg in 2011. He is a registered Professional Natural Scientist (Pr. Sci. Nat) with SACNASP (Reg. No. 116579), specializing in Botanical Science and Ecological Science.

With over a decade of experience as an Environmental Consultant, Ndumiso has been actively involved in biodiversity, ecological, and water resource assessments across a range of sectors. His portfolio includes ecological impact assessments for mining operations, housing developments, transportation infrastructure, and rehabilitation projects. A detailed curriculum vitae is available upon request.

7 Desktop Assessment

A high-level desktop assessment was conducted to identify watercourse features within 500m of the project area.

7.1 Regional Vegetation

The project area was located predominantly within the KwaZulu-Natal Coastal Belt vegetation unit as presented in Figure 7-1. The distribution of the vegetation unit ranges from Mtunzi to Margate as a broad coastal strip. The altitude of this vegetation type is between 20 meters above sea level to 450 meters above sea level, Mucina & Rutherford (2006).

Undulating coastal plains cover this vegetation type with historic signs of dense subtropical coastal forests being present. Primary grasslands still dominate areas protected from veld fires, especially in high altitude areas with high rainfall. These grasslands are dominated specifically by *Themeda triandra*. This vegetation type is affected by timber plantations, vast amounts of sugarcane fields and infrastructure related to tourism. Secondary grasslands dominated by Aristida as well as thickets and patches of coastal thornveld is still present in between disturbed areas.

This vegetation type is Vulnerable with only small patches of land being conserved. These conservation areas include the Ngoye, Vernon Crookes and Mbumbazi nature reserves. Approximately 50% of this vegetation type is transformed by cultivation, road building and urban sprawl. Alien species include *Solanum mauritianum, Melia azedarach*, *Lantana camera* and *Chromolaena odorata*.

The status of the vegetation is summarised in Table 7-1 and the dominant plant species within the vegetation unit are shown in Table 7-2.

Table 7-1: Vegetation Status

Vegetation Name	Ecological Status	Conservation Status	% of Project Area
KwaZulu-Natal Coastal Belt	Moderately Modified	Endangered (2022)	100%

Table 7-2: Dominant Plant Species

Vegetation Unit	Dominant Plant Species
KwaZulu-Natal Coastal Belt	*Vechelia robusta, Sclerocarya birrea subsp. caffra, Vechelia nilotica, Vechelia natalita, Vechelia tortilis subsp. heteracantha, Ziziphusmucronate, Cussionia spicata, Euphorbia ingens, Themeda triandra, Cynodon dactylon, Tristachya leucothrix, Hyparrhenia hirta Eragrostis curvula, Eragrostis plan, Harpachloa falx Aristida congesta Sporobulus africana*

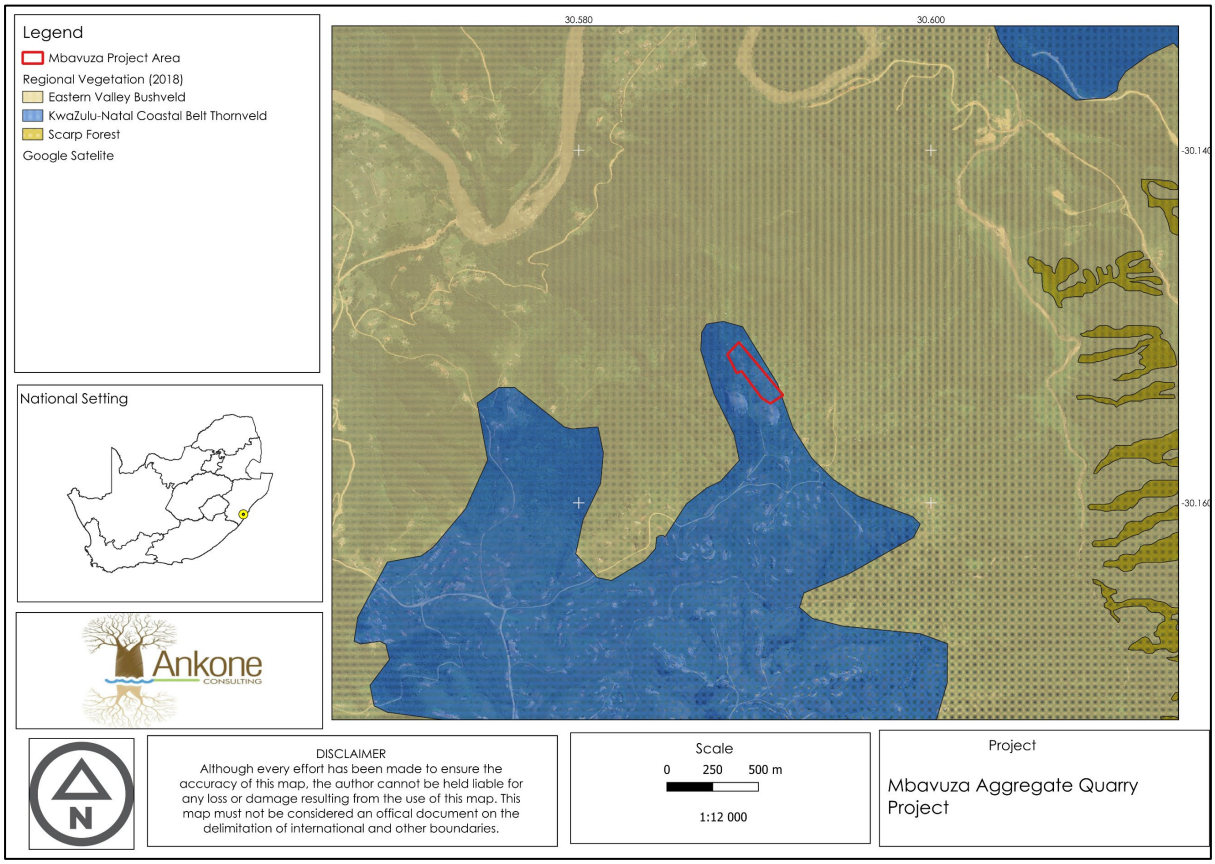


Figure 7-1: The regional vegetation associated with the proposed project

7.2 Plant Species List

The Plants of Southern Africa (POSA) Database was utilised to obtain a list of plant species that could occur within the project area. The plant presented in Table 7-3 presents plant species of conservation concern that may occur in the project area.

Table 7-3: Plant Taxa that may be found in the project area (POSA, 2024)

Family	Species	Ecology
Agavaceae	*Chlorophytum haygarthii*	Indigenous
Fabaceae	*Indigofera jucunda*	Indigenous; Endemic
Lamiaceae	*Plectranthus montanus*	Indigenous
Orchidaceae	*Orthochilus foliosus*	Indigenous
Sphagnaceae	*Sphagnum capense*	Indigenous
Mniaceae	*Mielichhoferia bryoides*	Indigenous

Scrophulariace ae	*Tetraselago sp.*	
Asphodelaceae	*Aloe modesta*	Indigenous; Endemic
Asphodelaceae	*Aloe alooides*	Indigenous; Endemic
Asteraceae	*Helichrysum umbraculigerum*	Indigenous
Apocynaceae	*Tabernaemontana sp.*	
Apocynaceae	*Brachystelma pygmaeum pygmaeum*	Indigenous; Endemic
Celastraceae	*Gymnosporia harveyana harveyana*	Indigenous
Urticaceae	*Pouzolzia mixta*	Indigenous
Cyperaceae	*Kyllinga odorata*	Indigenous
Myrsinaceae	*Rapanea melanophloeos*	Indigenous
Cyperaceae	*Ficinia angustifolia*	Indigenous; Endemic
Malvaceae	*Hermannia glanduligera*	Indigenous
Ericaceae	*Erica revoluta*	Indigenous
Hymenophyllac eae	*Hymenophyllum capillare alternialatum*	Indigenous
Fabaceae	*Tephrosia multijuga*	Indigenous
Orchidaceae	*Disa baurii*	Indigenous
Stilbaceae	*Halleria lucida*	Indigenous
Vitaceae	*Cyphostemma anatomicum*	Indigenous; Endemic
Asparagaceae	*Asparagus ramosissimus*	Indigenous
Cupressaceae	*Widdringtonia nodiflora*	Indigenous
Fabaceae	*Argyrolobium pseudotuberosum*	Indigenous
Aspleniaceae	*Asplenium friesiorum*	Indigenous
Aspleniaceae	*Asplenium inaequilaterale*	Indigenous
Asteraceae	*Senecio sp.*	
Polygalaceae	*Polygala houtboshiana*	Indigenous
Asteraceae	*Gymnanthemum corymbosum*	Indigenous
Oleaceae	*Olea capensis macrocarpa*	Indigenous
Asteraceae	*Berkheya subulata subulata*	Indigenous; Endemic
Ranunculaceae	*Thalictrum rhynchocarpum*	Indigenous
Asteraceae	*Helichrysum appendiculatum*	Indigenous
Poaceae	*Chloris gayana*	Indigenous
Asteraceae	*Senecio macrocephalus*	Indigenous
Bryaceae	*Bryum dichotomum*	Indigenous
Poaceae	*Eragrostis curvula*	Indigenous
Cyperaceae	*Bulbostylis scleropus*	Indigenous
Alliaceae	*Tulbaghia coddii*	Indigenous; Endemic
Poaceae	*Andropogon lacunosus*	Indigenous
Rubiaceae	*Oldenlandia affinis fugax*	Indigenous
Pottiaceae	*Syntrichia magilliana*	Indigenous; Endemic
Zygophyllaceae	*Tribulus terrestris*	Indigenous
Asteraceae	*Berkheya radula*	Indigenous
Asteraceae	*Brachylaena transvaalensis*	Indigenous
Frullaniaceae	*Frullania lindenbergii*	Indigenous
Iridaceae	*Gladiolus longicollis platypetalus*	Indigenous

Fissidentaceae	*Fissidens ovatus*	Indigenous
Ericaceae	*Erica leucopelta ephebioides*	Indigenous; Endemic
Myrsinaceae	*Myrsine africana*	Indigenous
Rubiaceae	*Galopina aspera*	Indigenous
Gesneriaceae	*Streptocarpus sp.*	
Asphodelaceae	*Kniphofia rigidifolia*	Indigenous; Endemic
Cyperaceae	*Pycreus rehmannianus*	Indigenous
Lobeliaceae	*Cyphia stenopetala*	Indigenous
Lamiaceae	*Stachys graciliflora*	Indigenous
Amaryllidaceae	*Cyrtanthus galpinii*	Indigenous
Agavaceae	*Chlorophytum bowkeri*	Indigenous
Lamiaceae	*Plectranthus laxiflorus*	Indigenous
Bryaceae	*Anomobryum julaceum*	Indigenous
Asteraceae	*Coreopsis lanceolata*	notIndigenous; Naturalised; Invasive
Cyperaceae	*Lipocarpha nana*	Indigenous
Polygonaceae	*Rumex crispus*	notIndigenous; Naturalised; Invasive
Brachytheciace ae	*Rhynchostegium brachypterum*	Indigenous
Asteraceae	*Nolletia ciliaris*	Indigenous
Fabaceae	*Indigofera atrata*	Indigenous
Asphodelaceae	*Aloe sp.*	
Fossombroniace ae	*Fossombronia crispa*	Indigenous
Poaceae	*Ischaemum fasciculatum*	Indigenous
Aspleniaceae	*Asplenium sandersonii*	Indigenous
Pottiaceae	*Gymnostomum bewsii*	Indigenous
Fabaceae	*Elephantorrhiza elephantina*	Indigenous
Cyperaceae	*Costularia natalensis*	Indigenous
Hyacinthaceae	*Dipcadi marlothii*	Indigenous
Amaryllidaceae	*Cyrtanthus breviflorus*	Indigenous
Cyperaceae	*Cyperus keniensis*	Indigenous
Lophocoleacea e	*Lophocolea difformis*	Indigenous
Asteraceae	*Helichrysum polycladum*	Indigenous
Menispermacea e	*Stephania abyssinica tomentella*	Indigenous
Fabaceae	*Senegalia ataxacantha*	Indigenous
Pteridaceae	*Cheilanthes viridis viridis*	Indigenous
Lejeuneaceae	*Cheilolejeunea krakakammae*	Indigenous
Poaceae	*Panicum schinzii*	Indigenous
Scrophulariace ae	*Zaluzianskya katharinae*	Indigenous; Endemic
Aspleniaceae	*Asplenium monanthes*	Indigenous
Rubiaceae	*Psychotria capensis capensis*	Indigenous
Malvaceae	*Hermannia floribunda*	Indigenous
Fabaceae	*Dichilus pilosus*	Indigenous; Endemic
Haloragaceae	*Laurembergia repens brachypoda*	Indigenous
Melianthaceae	*Bersama tysoniana*	Indigenous
Asteraceae	*Eumorphia davyi*	Indigenous; Endemic

Iridaceae	*Gladiolus pubigerus*	Indigenous
Poaceae	*Digitaria debilis*	Indigenous
Bignoniaceae	*Kigelia africana*	Indigenous
Osmundaceae	*Todea barbara*	Indigenous
Hamamelidace ae	*Trichocladus grandiflorus*	Indigenous
Fabaceae	*Indigofera homblei homblei*	Indigenous
Iridaceae	*Moraea muddii*	Indigenous; Endemic
Fabaceae	*Albizia versicolor*	Indigenous
Orchidaceae	*Pterygodium hastatum*	Indigenous
Hyacinthaceae	*Ledebouria parvifolia*	Indigenous; Endemic
Ruscaceae	*Eriospermum cooperi cooperi*	Indigenous
Asteraceae	*Senecio madagascariensis*	Indigenous
Rubiaceae	*Anthospermum herbaceum*	Indigenous
Amaryllidaceae	*Brunsvigia radulosa*	Indigenous
Hyacinthaceae	*Drimia depressa*	Indigenous
Asteraceae	*Seriphium plumosum*	Indigenous
Caryophyllacea e	*Silene burchellii pilosellifolia*	Indigenous
Lentibulariacea e	*Utricularia livida*	Indigenous
Iridaceae	*Dierama medium*	Indigenous
Pteridaceae	*Cheilanthes involuta involuta*	Indigenous
Iridaceae	*Gladiolus woodii*	Indigenous
Acanthaceae	*Sclerochiton harveyanus*	Indigenous
Cannaceae	*Canna indica*	notIndigenous; Naturalised; Invasive
Asphodelaceae	*Aloe nubigena*	Indigenous; Endemic
Poaceae	*Triraphis andropogonoides*	Indigenous
Sapindaceae	*Cardiospermum corindum*	Indigenous

7.3 Fauna

A desktop assessment was performed with the aid of The Animal Demographic Unit Virtual Museum (ADU) and South African Bird Atlas Project 2 (SABAP 2). The study identified avifaunal species that may occur within the study area. It must be noted that the desktop study presents data over the entire Quarter Degree Square (QDS) and is not limited to the study area. Table 7-4 presents bird species that are of ecological significance that may occur within the project area.

Table 7-4: The possible ecologically significant bird species

Common name	Species name	Conservation Status
Bustard, Kori	Ardeotis kori	VU
Eagle, Martial	Polemaetus bellicosus	VU
Eagle, Tawny	Aquila rapax	VU
Falcon, Lanner	Falco biarmicus	NT
Marsh-harrier, African	Circus ranivorus	VU
Oxpecker, Red-billed	Buphagus erythrorhynchus	NT
Secretarybird, Secretarybird	Sagittarius serpentarius	NT

Common name	Species name	Conservation Status
Stork, Yellow-billed	Mycteria ibis	NT
Vulture, Cape	Gyps coprotheres	VU
Vulture, Lappet-faced	Torgos tracheliotus	VU
Vulture, White-backed	Gyps africanus	VU

The possible faunal species identified and presented in Table 7-5, Table 7-6 and Table 7-7 represents desktop data. The data presents the faunal species that may be identified within the project area in its natural and unmodified state. The species that are of ecological significance are presented in bold in the table. It must be noted that species presented in these tables are species that have been reported in the area after the year 2010.

Table 7-5: Mammal species that may occur within project area

Family	Scientific name	Common name	Conservation Status
Bovidae	*Antidorcas marsupialis*	Springbok	LC
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	LC
Bovidae	*Raphicerus campestris*	Steenbok	LC
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC
Bovidae	*Tragelaphus angasii*	Nyala	LC
Canidae	*Vulpes chama*	Cape Fox	LC
Herpestidae	*Atilax paludinosus*	Marsh Mongoose	LC
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC
Herpestidae	*Suricata suricatta*	Meerkat	LC
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC
Leporidae	*Lepus sp.*	Hares	LC
Leporidae	*Lepus saxatilis*	Scrub Hare	LC
Macroscelididae	*Elephantulus sp.*	Elephant Shrews	LC
Muridae	*Aethomys sp.*	Veld rats	LC
Muridae	*Mastomys sp.*	Multimammate Mice	LC
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	LC
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT
Mustelidae	*Hydrictis maculicollis*	Spotted-necked Otter	LC 2008)

Table 7-6: Amphibian species that may occur within project area

Family	Scientific name	Common name	Conservation Status
Pyxicephalidae	Amietia delalandii	Delalande's River Frog	LC
Pyxicephalidae	Amietia fuscigula	Cape River Frog	LC
Pyxicephalidae	Amietia poyntoni	Poynton's River Frog	LC
Pyxicephalidae	Cacosternum boettgeri	Common Caco	LC
Pyxicephalidae	Pyxicephalus adspersus	Giant Bull Frog	NT
Pyxicephalidae	Tomopterna natalensis	Natal Sand Frog	LC
Bufonidae	Sclerophrys gutturalis	Guttural Toad	LC
Pipidae	Xenopus laevis	Common Platanna	LC

Family	Scientific name	Common name	Conservation Status
Pyxicephalidae	Amietia delalandii	Delalande's River Frog	LC
Pyxicephalidae	Amietia fuscigula	Cape River Frog	LC
Pyxicephalidae	Amietia poyntoni	Poynton's River Frog	LC
Pyxicephalidae	Cacosternum boettgeri	Common Caco	LC
Pyxicephalidae	Pyxicephalus adspersus	Giant Bull Frog	LC
Pyxicephalidae	Tomopterna natalensis	Natal Sand Frog	LC

Table 7-7: Reptile species that may occur within project area

Family	Scientific name	Common name	Conservation Status
Agamidae	Agama atra	Southern Rock Agama	LC
Colubridae	Dasypeltis scabra	Rhombic Egg-eater	LC
Cordylidae	Cordylus vittifer	Common Girdled Lizard	LC
Elapidae	Hemachatus haemachatus	Rinkhals	LC
Lamprophiidae	Aparallactus capensis	Black-headed Centipede- eater	LC
Lamprophiidae	Boaedon capensis	Brown House Snake	LC
Lamprophiidae	Lycophidion capense capense	Cape Wolf Snake	LC
Lamprophiidae	Psammophylax rhombeatus	Spotted Grass Snake	LC
Lamprophiidae	Pseudaspis cana	Mole Snake	LC
Leptotyphlopidae	Leptotyphlops sp.		LC
Scincidae	Trachylepis punctatissima	Speckled Rock Skink	LC
Scincidae	Trachylepis varia sensu lato	Common Variable Skink Complex	LC
Typhlopidae	Afrotyphlops bibronii	Bibron's Blind Snake	LC

7.4 National Biodiversity Assessment

7.4.1 National Wetlands Map 5

The National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018. Mapping the locality of wetlands is essential so that they may be classified into the different wetland ecosystem types across the country, which in turn can be used along with other data to identify wetlands of conservation significance. The identified wetland areas of the NWP5 within proximity to the project area are presented in Figure 7-2. There were no NWM 5 watercourses identified within the project area nor within 500m of the proposed project area.

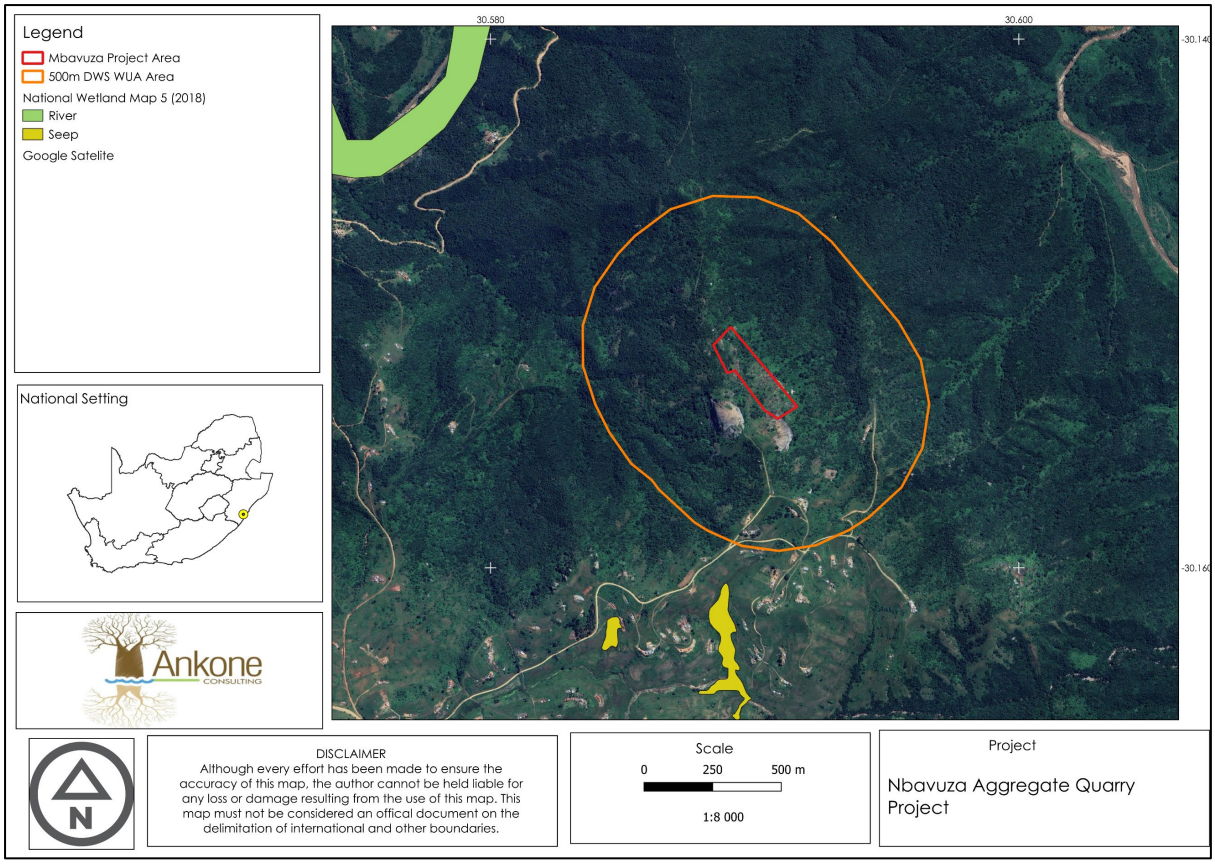


Figure 7-2: The National Wetland Map 5 areas associated with the proposed project

7.4.2 Ecosystem Status

The ecosystems, as determined by the National Biodiversity Assessment (2018), within the project area, were considered as Vulnerable (VU) as seen in Figure 7-3. The state of the ecosystems indicated that these ecosystems are at increased risk of destruction or alteration. The protection level of the ecosystems within the project area is poorly protected and not protected which indicates a large risk of loss with little conservation of the ecosystems.

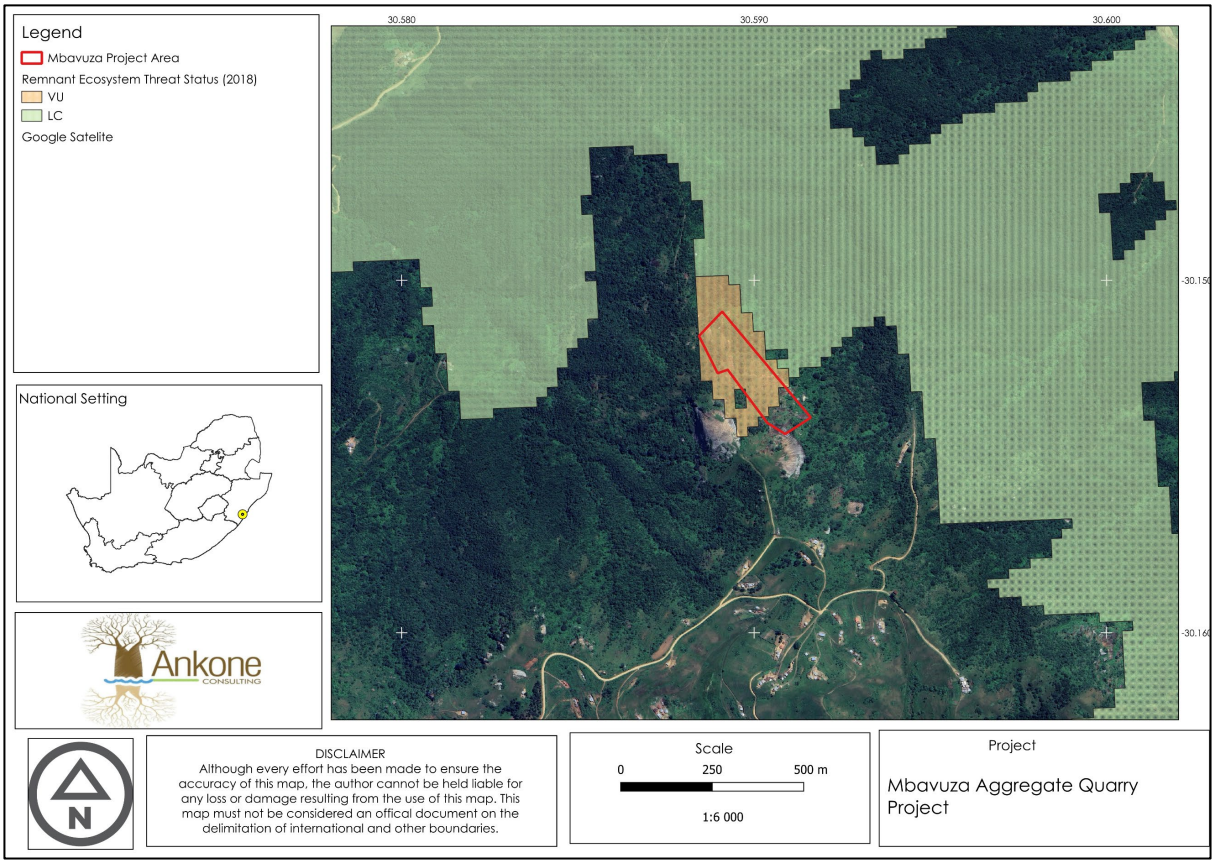


Figure 7-3: Threat status of ecosystems within the project area

7.5 Land Cover

The proposed project area was determined to fall within land cover types classified as cultivated lands and natural grasslands as presented in Figure 7-4. These classifications indicate a mosaic of modified and semi-natural habitats, with cultivated areas likely supporting limited biodiversity, while the grassland portions retain greater ecological value. The grasslands, in particular, may provide important habitat for indigenous flora and fauna, and therefore warrant careful consideration during planning and mitigation.

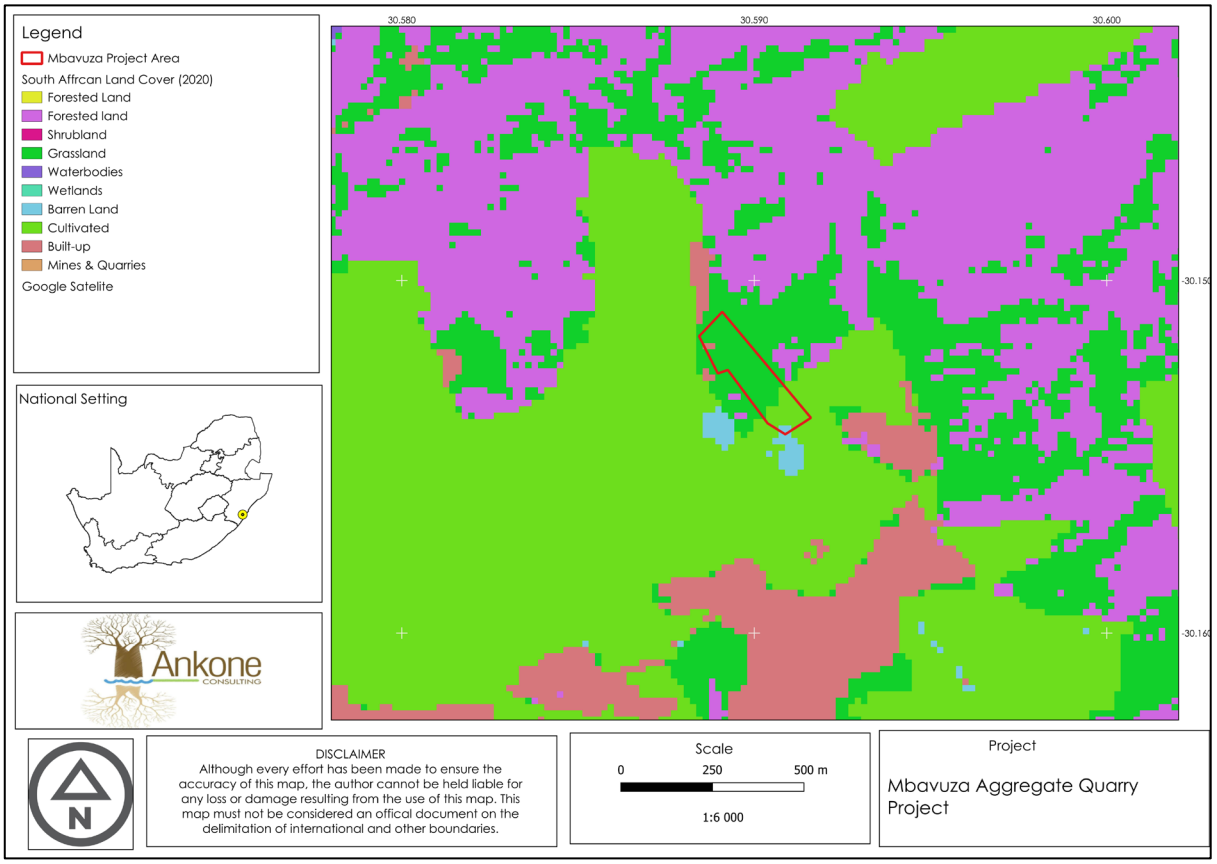


Figure 7-4: The land cover associated with the project area

7.6 Important Bird Areas

There were no Important Bird Areas identified within 20km of the project area.

7.7 Protected Areas

Protected areas are areas of conservation importance and are gazetted as proclaimed nature reserves. These areas are protected as they provide safe areas of fauna and flora species. The proposed project area is over 10km away from any protected areas.

7.8 KwaZulu-Natal Biodiversity Spatial Plan (2016)

The KwaZulu-Natal Biodiversity Spatial Plan identifies areas of ecological importance within the KwaZulu-Natal Province. The categories of the ecological areas and their descriptions are presented in Table 7-8.

Table 7-8: The ecological categories and their descriptions

CBA Categories	Description	Land Use Target
Critical Biodiversity Areas (CBAs) - Crucial for supporting biodiversity features and ecosystem functioning and are required to meet biodiversity and/or process targets		
Critical Biodiversity Areas: Irreplaceable	Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems.	Maintain in a natural state with limited to no biodiversity loss

CBA Categories	Description	Land Use Target
Critical Biodiversity Areas: Optimal	Areas that represent an optimised solution to meet the required biodiversity conservation targets while avoiding high-cost areas as much as possible (Category driven primarily by process but is informed by expert input).	Maintain in a natural state with limited to no biodiversity loss
Ecological Support Areas (ESAs) - Functional but not necessarily entirely natural areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within Critical Biodiversity Areas		
Ecological Support Areas	Functional but not necessarily entirely natural terrestrial or aquatic areas that are required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the Critical Biodiversity Areas. The area also contributes significantly to the maintenance of Ecosystem Services.	Maintain ecosystem functionality and connectivity allowing for some loss of biodiversity
Ecological Support Areas: Species specific	Terrestrial modified areas that provide a critical support function to a threatened or protected species, for example agricultural land or dams associated with nesting/roosting sites	Maintain current land use or rehabilitate back to functional natural area
Ecological Support Areas: Buffers	Terrestrial areas identified as requiring land-use management guidance not necessarily due to biodiversity prioritisation, but in order to address other legislation / agreements which the biodiversity sector is mandated to address, e.g. WHS Convention, Triggers Listing Notice criteria, etc.	Maintain or improve ecological and tourism functionality of a PA or WHS

There were no Critical Biodiversity Areas identified within the proposed area (Figure 7-5) which indicates that there are no potentially sensitive habitats within the project area.

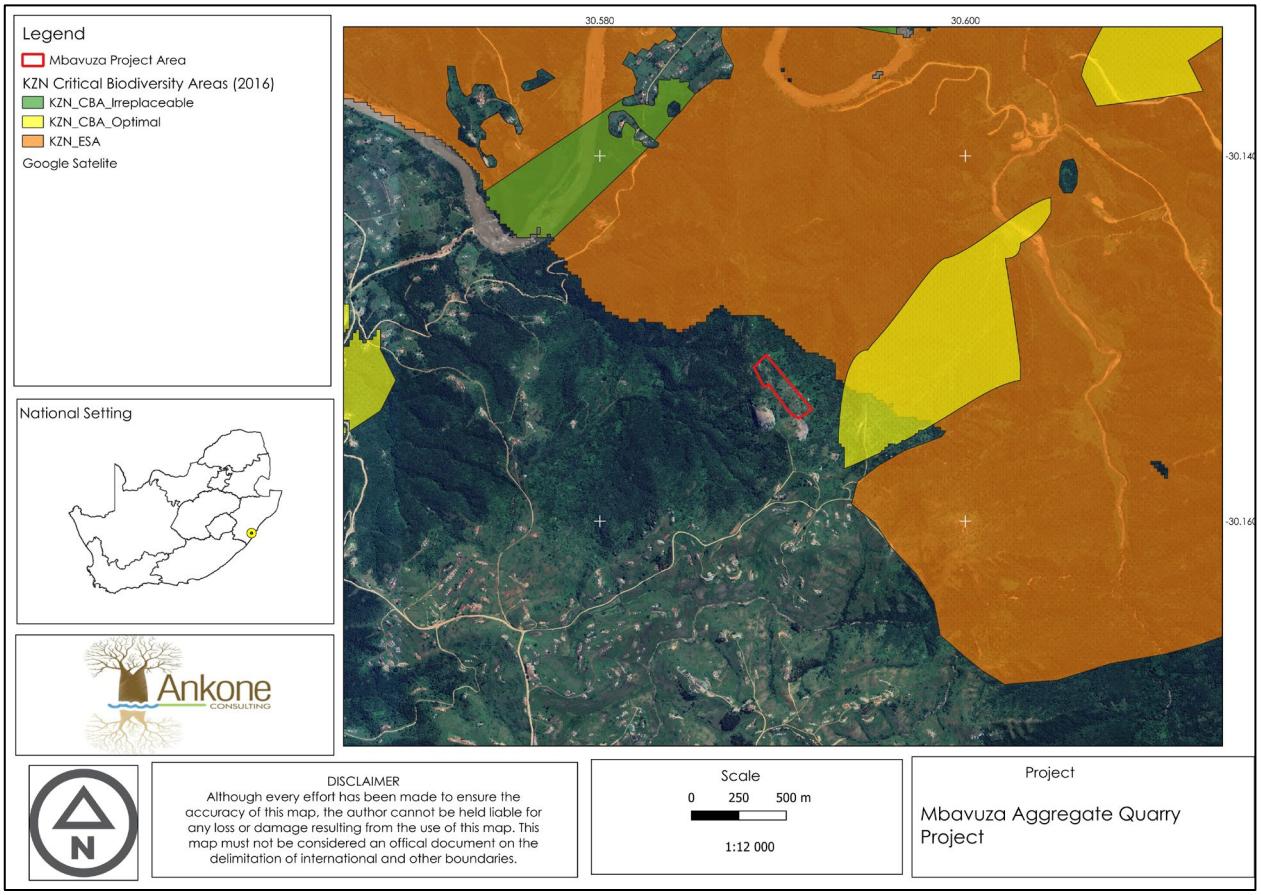


Figure 7-5: The KZN CBA areas associated with the project area

8 Field Investigation

8.1 Vegetation

The vegetation within the project area was largely uniform and represented a modified grassland vegetation unit as presented in Figure 8-1. The unit has been altered from the natural state with the vegetation being dominated by a grass layer consisting of short to medium grasses including *Themeda triandra*, *Eragrostis curvuala* and *Cynodon dactylon*. *Melenis repens* dominatyed areas adjacent to roads and developments. *Lantana camara* was identified in large areas of the project area. Much of the project area is utilized as natural areas with some for low intensity livestock grazing and housing. The overall plant diversity within the project area was considered moderate. The findings of the 2021 survey were confirmed in 2025 as presented in Figure 8-2.

Figure 8-1: The vegetation within the project area (2021)

Figure 8-2: The vegetation within the project (2025)

The plant species observed within the project area are listed in Table 8-1. There were

seven (7) alien invasive species identified within the survey transects of the project area. Some of the identified plant species are presented in Figure 8-3 and the alien invasive plant species in Figure 8-4.

Table 8-1: The identified plant species

Species name	Common name	Conservation status
Aristida congesta	Buffalo grass	
Aloe marlothii	Mountain aloe	Protected
Crassula arborescens		
Cussonia spicata	Cabbage tree	
Cyperus effusus		
Datura stramonium	Bitter Thorn-apple	Categroy 1b invasive
Digitaria eriantha	Finger grass	
Diospyros lycioides		
Eragrostis curvula	Cape love grass	
Euphorbia ingens	Tree euphorbia	
Helichrysum spp.		
Hypoxis hermerocallidea		
Melenis repens	Natal red top	
Melia azedarach	Syringa	Categroy 1b invasive
Panicum maximum		
Solanum mauritanuam	Bugweed	Categroy 1b invasive
Sporobolus africanus	Rat's tail grass	
Tagetes minuta	Khakibos	
Themeda triandra	Red grass	
Vechelia nilotica		
Verbena bonariensis	Purple top	Categroy 1b invasive

Figure 8-3: Identified plant species: a) Hypoxis hermerocallidea b) Sporobolus africanus c) Digitaria eriantha d) Euphorbia ingens e) Crassula arborescens

Figure 8-4: Identified alien invasive species: Lantana camara

8.1.1 Plant Species of Conservation Concern

The project area was ground-truthed to identify any plants of conservation concern. Several individuals of *Aloe marlothii* were identified in the project area as presented in Figure 8-3. The *Aloe marlothii* is protected in KwaZulu-Natal and South Africa.

Figure 8-3: The Aloe marlothii individuals identified within the project area

8.1.2 Vegetation Modification

The land uses within the local area have led to the modification of the natural vegetation and habitat structure. Several land uses were observed in the project area and these include cattle grazing (Figure 8-5), informal roads (Figure 8-6) and homesteads in the project area and surrounding areas. In many instances, human disturbance, including agricultural practices, lead to the degradation of vegetative structures and lowers the plant diversity. This was observed within the project area as a high level of mono-specificity of plant species was determined and areas of bare soil and sparse grassland (Figure 8-7) were observed.

Figure 8-5: Impacts to the vegetation: Cattle grazing

Figure 8-6: Impacts to the vegetation: Informal roads

Figure 8-7: Impacts to the vegetation: Sparse grassland

8.2 Fauna

The faunal species assessment was limited due to the open access nature of the site and relatively high foot traffic through the area. This presented a security risk for trapping mechanisms and isolated areas were avoided for investigation due to specialist safety protocols. The faunal survey was conducted by traversing the site on foot, identifying markers of faunal activity such as droppings, tracks and calls.

It must be noted that human activities and livestock grazing significantly influence faunal activity by altering habitats, increasing disturbance, and reducing available resources. These factors contribute to shifts in species behaviour, distribution, and overall biodiversity within affected ecosystems.

One of the primary ways in which human presence reduces faunal activity is through habitat modification and fragmentation. Land clearing, infrastructure development, and agricultural expansion result in the loss of natural habitats and create barriers that restrict wildlife movement (Fahrig, 2003). Many species, particularly large mammals and birds, require expansive, undisturbed habitats to thrive. Fragmentation disrupts ecological corridors, limiting access to essential resources such as food and water, and isolating populations, which can lead to local extinctions (Haddad et al., 2015).

Disturbance caused by human activity further contributes to the decline in faunal presence. Wildlife often exhibits avoidance behaviour in areas with high human activity due to noise, artificial structures, and unpredictable movement patterns (Blumstein, 2010). Studies have shown that species such as large carnivores and ungulates become more vigilant or alter their movement patterns in human-dominated landscapes. Similarly, bird species richness and diversity tend to decline in

areas with frequent human foot traffic, as disturbances disrupt foraging and nesting behaviours (Fernández-Juricic et al., 2004).

Livestock grazing has profound effects on ecosystem dynamics, particularly in semi-arid environments. Overgrazing by domestic animals leads to vegetation degradation, reducing plant cover and altering plant species composition. This, in turn, affects smaller fauna such as rodents, reptiles, and invertebrates that rely on vegetation for shelter and food (Milchunas & Lauenroth, 1993). Large herbivores, including indigenous antelope species, may also be displaced due to direct competition with livestock for limited grazing resources (du Toit & Cumming, 1999).

Another key impact of livestock presence is the increased predation pressure and competition it creates. Domestic animals often attract predators such as jackals and caracals, leading to conflicts with farmers who implement lethal predator control measures (Thorn et al., 2012). This disrupts natural predator-prey relationships and can result in the decline of predator populations. Additionally, competition between livestock and native herbivores for food and water sources has been observed in multiple ecosystems, leading to shifts in wildlife distribution (Fritz et al., 2002).

Water scarcity is another significant issue exacerbated by livestock grazing. Natural water sources are often depleted or contaminated by domestic animals, making them less available for wildlife. This forces wild animals to travel greater distances in search of water, increasing energy expenditure and exposing them to higher predation risks (James et al., 1999; Redfern et al., 2003)

8.2.1 Mammal Species

The mammalian species activity was determined to be low resulting from habitat alteration and faunal displacement. The use of the area for livestock grazing and development of residential settlements, coupled with various artisanal sand mining sites along with foot and vehicular traffic make the project area undesirable for mammal species. The identified mammal species included the yellow mongoose, domesticated cow, and goats. The identified mammal species are listed in Table 8-2

Table 8-2: The identified mammal species occurring within the project area

Family	Species Name	Common Name	Conservation status
Bovidae	*Bos taurus*	Cow	LC

8.2.2 Herpertofauna

The herpetofauna activity was determined to be low at the time of the survey.

8.2.3 Avifauna

The avifaunal activity throughout the project area is limited, with only opportunistic sightings recorded, particularly in the future expansion zone. The primary and secondary project areas exhibit low avifaunal presence due to habitat disturbances and alterations, likely caused by land use changes, human activity, or environmental degradation.

A key observation is that the area primarily experiences flyovers rather than direct visits, indicating that it may not provide suitable foraging, nesting, or roosting habitats for local bird species. This pattern suggests that the existing habitat structure does not support resident bird populations, the disturbance levels (e.g., noise, land modification, or pollution) are high enough to deter regular avian activity and that the area may still be part of migratory or transit routes, leading to occasional flyovers. The bird survey determined that avifaunal activity was low within the project as a result of the habitat structure and disturbance of the area. The bird species that were observed and positively identified within the project area are listed in Table 8-3.

Table 8-3: Identified bird species within the project area

Common name	Species name	Conservation Status
Olive-pigeon, African	*Columba arquatrix*	LC
Widowbird, Long-tailed	*Euplectes progne*	LC
Plover, Common Ringed	*Charadrius hiaticula*	LC
Robin-chat, Cape	*Cossypha caffra*	LC

8.3 Ecological Sensitivity

The assessment aided in identifying vegetation communities and delineating their respective boundaries, the various vegetation communities defined for the project area were further assessed qualitatively in terms of their ecological condition in order to estimate relative habitat sensitivity. The ecological function describes the structural and functional integrity of the vegetation communities/habitats which support the faunal communities. It also refers to the degree of ecological connectivity between the identified vegetation communities/habitats and other systems within the landscape (such as a combination of species composition; structural intactness and existing levels of anthropogenic disturbance, woody encroachment, etc.). The matrix presented in Table 8-4 was used to determine the ecological condition of the vegetation communities. The findings of the assessment are in bold and all caps throughout the matrix tables.

Table 8-4: Generic matrix used for the estimation and rating of vegetation ecological condition (using joint consideration of species composition and structural intactness).

		SPECIES COMPOSITION			
		Natural	Good	Fair	Poor
		Representative of reference vegetation type	>75% of expected species occur compared with an undisturbed site in a comparable vegetation type	<75% of expected species occur compared with an undisturbed site in a comparable vegetation type	<25% of expected species occur compared with an undisturbed site in a comparable vegetation type
Structural Intactness	Contiguous (reference)	Natural	Good	Fair	Poor
	Clumped	Good	Good	**FAIR**	Poor
	Scattered/patchy cover	Fair	Fair	Poor	Poor

	Sparse	Poor	Poor	Poor	Very Poor

Systems with a high degree of landscape connectivity (i.e. high ecological function) amongst each other are perceived to be more sensitive. The generic matrix presented in Table 8-5 was used for the assessment of vegetation sensitivity. The results of the ecological sensitivity assessment are presented in Table 8-7.

Table 8-5: Generic matrix used for the estimation of habitat sensitivity (based on the joint consideration of habitat condition and threat status of the vegetation type).

			HABITAT/VEGETATION CONDITION			
		Natural	**Good**	**Fair**	**Poor**	**Very Poor/ Transformed**
Vegetation Threat Status	**CRITICALLY ENDANGERED**	High	High	High	Moderate	Low
	Endangered	High	High	High	Moderate	Low
	Vulnerable	High	High	**MODERATE**	Low	Low
	Near Threatened	Moderate	Moderate	Moderate	Low	Low
	Least Threatened	Moderate	Moderate	Low	Low	Very Low

Ecological Sensitivity can be summarized according to the criteria presented in Table 8-6. The site sensitivity is presented in Table 8-7.

Table 8-6: Ecological Sensitivity Categories

High –	Sensitive vegetation communities with either low inherent resistance or resilience towards disturbance factors or vegetation that are considered important for the maintenance of ecosystem integrity. Most of these vegetation communities represent late succession ecosystems with high connectivity with other important ecological systems.
Moderate-	Vegetation communities that occur at disturbances of low-medium intensity and representative of secondary succession stages with some degree of connectivity with other ecological systems.
Low –	Degraded and highly disturbed vegetation with little ecological function.

Table 8-7. Summary of the ecological condition and sensitivity assessment for the vegetation within the project area

Vegetation Community	Condition	Threat Status	Ecological Sensitivity
Project area vegetation	Fair	VU (2018)	Moderate

8.3.1 Site Sensitivity Verification

A Site Sensitivity Verification was completed for the proposed project which is in accordance with the requirements of the specialist protocols. The sensitivity rating defined in the DFFE online screening tool report must be confirmed or disputed. The Site Sensitivity Verification is presented in Table 8-8.

Table 8-8: The Site Sensitivity Verification Summary

Theme	DFFE Screening Tool Report Sensitivity	Specialist Sensitivity	Rating Confirmed/ disputed and Reasons	Compliance Statement or Full Assessment
Terrestrial Biodiversity	Very High	Moderate	Disputed – High sensitivity associated with Vulnerable vegetation in area. Area determined to be degraded.	Full Assessment
Plant Species	Medium	Low	Disputed – Site is moderately altered with reduced biodiversity and subject to active livestock grazing	Full Assessment

9 Mitigation Heirachy

The National Environmental Management Act (NEMA, 1998) establishes the legal duty of care and requires application of the mitigation hierarchy (avoid–minimise–rehabilitate–offset) for any listed activity.

The National Environmental Management: Biodiversity Act (NEM:BA, 2004) enables the listing of threatened ecosystems and obligates protection measures. The KwaZulu-Natal Coastal Belt Thornveld is formally listed as an Endangered ecosystem, meaning it has a high risk of ecosystem collapse if further transformation occurs.

The National Biodiversity Assessment (NBA, 2011) and National Biodiversity Framework identify the KwaZulu-Natal Coastal Belt Thornveld as a national conservation priority.

The National Biodiversity Offset Guideline (2023), published under NEMA, provides the formal framework for biodiversity offsets. Where residual loss of an Endangered ecosystem is unavoidable, an offset must be designed to achieve at least "no net loss" and preferably a net gain in biodiversity conservation outcomes.

For the Mbavuza Quarry, avoidance and minimisation are not feasible due to the location of the targeted dolerite (Table 9-1). Rehabilitation will partially restore ecological function but not the original threatened ecosystem. Therefore, a compensatory biodiversity offset is mandatory to secure equivalent or greater conservation value elsewhere.

Table 9-1: The Outcome of the Mitigation Heirachy

Step in Hierarchy	Application at Mbavuza Quarry	Feasibility / Outcome
Avoidance	Avoidance is not feasible because the targeted dolerite material occurs entirely within the KwaZulu-Natal Coastal Belt Thornveld — an **Endangered** nationally-listed ecosystem (listed under the National Environmental Management: Biodiversity Act threatened ecosystems process). This means the footprint will remove threatened ecosystem habitat (NEM:BA, 2004; NBA, 2011).	**Not feasible** — the activity will cause direct loss of Endangered ecosystem within the permit area; avoidance is effectively ruled out (NEM:BA, 2004).
Minimisation	Implement strict on-site controls to reduce indirect impacts: progressive clearing, topsoil management, dust suppression, erosion and stormwater controls, strict access control, alien invasive control, and construction timing to avoid sensitive seasons. These measures reduce off-site / indirect effects but do not prevent loss of the on-footprint Endangered Thornveld (NEMA, 1998).	**Partially feasible** — reduces collateral impacts to adjacent habitat and downstream/aerial effects, but does not prevent the permanent loss of the Endangered ecosystem on the mined footprint (NEMA, 1998; DEA, 2011).
Rehabilitation / Restoration	Progressive rehabilitation (retain and re-spread topsoil, re-contouring, replant with locally indigenous Thornveld species, long-term invasive control and monitoring). Note: restoration may improve landscape function but cannot reliably restore the site to pre-mining Endangered-ecosystem condition given the irreversible removal and geomorphological changes (NBA, 2011).	**Partially feasible** — improves post-mining ecological condition and reduces legacy impacts, but full restoration to pre-mining Endangered ecosystem condition is unlikely (NBA, 2011).
Offsetting	A formal biodiversity offset is required for the residual, significant and irreversible biodiversity loss. Offsets must follow the National Biodiversity Offset Guideline (First Edition, 2023**)** issued under NEMA (section 24J), and be designed to achieve no net loss or preferably a net gain for the KwaZulu-Natal Coastal Belt Thornveld. Offset options include securing and placing into formal conservation (stewardship, protected area expansion) an equivalent or higher quality/area of listed Thornveld, restoring degraded patches of the same ecosystem type, or contributing to an approved biodiversity stewardship/offset fund in line with the Guideline (DEA&DP, 2023).	**Mandatory** — offsets are the only lawful mechanism to compensate for irreversible loss and must meet NEMA / Offset Guideline requirements, including additionality, permanence, equivalence, and measurable outcomes (DEA&DP, 2023).

9.1 Conceptual Biodiversity Offset

9.1.1 Context

The proposed Mbavuza Quarry is located entirely within the KwaZulu-Natal Coastal Belt Thornveld, an Endangered Nationally Threatened Ecosystem listed under the National Environmental Management: Biodiversity Act (Act 10 of 2004). Avoidance and minimisation are not feasible due to the targeted dolerite resource, and rehabilitation cannot restore the pre-mining ecological condition. In accordance with the mitigation hierarchy (NEMA, 1998), a biodiversity offset is therefore required to address residual, irreversible biodiversity loss.

9.1.2 Offset Objectives

The biodiversity offset seeks to:

- Achieve no net loss and, where possible, a net gain of KwaZulu-Natal Coastal Belt Thornveld.
- Secure and manage alternative land parcels of equivalent or greater ecological value to compensate for permanent loss within the mining footprint.
- Contribute to the long-term conservation and ecological functioning of the Endangered ecosystem, in line with the National Biodiversity Offset Guideline (DEA&DP, 2023).

9.1.3 Offset Ratio and Scale

Offset ratio: A minimum ratio of 1:30 (hectares offset : hectares impacted) is recommended for Endangered ecosystems in line with the National Biodiversity Offset Guideline (2023).

The final ratio will be confirmed following specialist quantification of residual impacts, including consideration of ecosystem condition, irreplaceability, and contribution to provincial biodiversity targets.

9.1.4 Candidate Offset Sites

Candidate sites will be identified through a GIS-based and field-verified assessment, guided by the following criteria:

- Must be KwaZulu-Natal Coastal Belt Thornveld (same ecosystem type).
- Preferably located within a Critical Biodiversity Area (CBA), Ecological Support Area (ESA), or within identified Protected Area Expansion focus zones.
- Must be of equal or better condition than the impacted area.
- Land tenure suitability (e.g., private land willing to enter biodiversity stewardship agreements, or state/provincial land aligned with conservation planning).

9.1.5 Offset Mechanisms

Offset implementation will consider one or a combination of the following:

- Biodiversity Stewardship Agreements with private landowners, securing conservation areas in perpetuity under NEM:BA provisions.
- Protected Area Expansion through incorporation into provincial or municipal reserves.
- Active restoration of degraded KwaZulu-Natal Coastal Belt Thornveld patches within offset sites to improve ecosystem condition.
- Contribution to a provincial biodiversity offset fund or trust (if available) for management and monitoring of secured offset land.

9.1.6 Governance, Monitoring and Reporting

A Biodiversity Offset Management Plan (BOMP) will be prepared, setting out measurable outcomes, performance indicators, and management actions for the secured offset site(s).

Long-term governance will be secured via legal instruments (conservation servitudes, stewardship contracts, or protected area declaration).

Independent ecological monitoring will be undertaken at least annually for the first 5 years, and every 3 years thereafter, with results submitted to the competent authority and SANBI.

A sustainability mechanism (e.g., endowment, offset trust, or long-term funding agreement) will ensure perpetual management of the offset site(s).

9.1.7 Compliance and Policy Alignment

The Offset Strategy must be aligned with:

- NEMA (1998) – Mitigation hierarchy and duty of care.
- NEM:BA (2004) – Protection of threatened ecosystems.
- National Biodiversity Assessment (2011) – Ecosystem priorities.
- National Biodiversity Offset Guideline (2023) – Offset principles, ratios, and requirements.

10 Impact Assessment

10.1 Construction Phase

The impacts during the construction phase will be brought about by the site clearing and establishment activities. The expected impacts during the construction phase are:

- The clearing of vegetation
- Loss of species of conservation concern
- Displacement of faunal species
- Killing of faunal species.

10.2 Operational Phase

The impacts during the operational phase will be brought about by the operation of the mine, access roads and associated activities. The expected impacts during the operational phase are:

- Alien plant establishment
- Disturbance/Displacement of Faunal species
- Disturbance of vegetation communities
- Habitat fragmentation
- Killing of faunal species
- Continuous rehabilitation

10.3 Decommissioning and Closure Phase

Impacts during the closure and rehabilitation phase will be brought about by the activities relating to the removal of infrastructure, closing and sealing-off of pits and the final landscape shaping and revegetation. The expected impacts during the closure and rehabilitation phase are:

- Encroachment of alien invasive plant species
- Loss of species of conservation concern
- Impact on the growth and health of both fauna and flora.

10.4 Impact Evaluation

The impact assessment is presented in Table 10-1.

Table 10-1: Impact Assessment

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
Construction																
Biodiversity	Clearing of vegetation	Destruction of vegetation	*Major -*	*Short Term < 18 months*	*Site or Local*	Medium	*Definite*	Medium	Yes	Avoid sensitive areas and implement buffer zones Avoid areas in which plant species of conservation concern may occur; If some areas cannot be avoided implement rescue of plant species of conservation concern. Fence off the work area and demarcate clearly	*Major-*	*Short Term < 18 months*	*Site or Local*	Medium	*Possible*	Medium
Biodiversity	Loss of plant SCC	Removal of vegetation	*Major -*	*Short Term < 18 months*	*Site or Local*	Medium	*Definite*	Medium	Yes	Limit the footprint area to the pit and infrastructure Avoid areas of remaining indigenous vegetation implement rescue of plant species of conservation concern.	*Major -*	*Short Term < 18 months*	*Site or Local*	Medium	*Possible*	Medium
Biodiversity	Displacement of fauna species	Habitat disturbance	*Moderate -*	*Short Term < 18 months*	*Site or Local*	Low	*Definite*	Medium	Yes	Avoid high biodiversity sensitivity areas (natural vegetation, watercourses & wetlands) and comply to prescribed buffer zones. Implement training and awareness programs on human-wildlife conflict Limit working to daytime hours, no work or bright lights at night	*Moderate -*	*Short Term < 18 months*	*Site or Local*	Low	*Possible*	Low
Biodiversity	Loss of faunal SCC	Habitat Destruction	*Moderate -*	*Short Term < 18 months*	*Site or Local*	Low	*Definite*	Medium	Yes	Avoid areas of faunal habitat Implement training and awareness programs on human-wildlife conflict Limit working to daytime hours, no	*Moderate -*	*Short Term < 18 months*	*Site or Local*	Low	*Possible*	Low

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
										work or bright lights at night						
Operation																
Biodiversity	Alien plant establishment	Degradation of vegetation	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Definite*	Medium	Yes	Implementation of alien invasive plant management plan needs to be continued during operation to prevent the growth of invasive on cleared areas.	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium
Biodiversity	Disturbance/Displacement of Faunal species	Biodiversity loss	*Moderate -*	*Long Term > 5 years*	*Regional*	High	*Definite*	High	Yes	Minimise footprint area Work only in clearly demarcated areas Implement training and awareness programs on human-wildlife conflict Limit working to daytime hours, no work or bright lights at night Monitor perimeter fences and carry out required maintenance immediately	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium
Biodiversity	Disturbance of vegetation communities	Habitat destruction	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Definite*	Medium	Yes	Minimise footprint area Work only in clearly demarcated areas Establish on-site nursery to nurture indigenous plants and plants of conservation concern	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Unlikely*	Low
Biodiversity	Habitat fragmentation	Habitat degradation and loss	*Moderate -*	*Long Term > 5 years*	*Regional*	High	*Definite*	High	Yes	Minimise footprint area Work only in clearly demarcated areas Rehabilitate disturbed areas	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Unlikely*	Medium
Biodiversity	Killing of faunal species	Biodiversity loss	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium	Yes	Minimise footprint area Work only in clearly demarcated areas Implement training and awareness programs on human-wildlife conflict	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Unlikely*	Low
Biodiversity	Continuous rehabilitation	Altered habitat	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Definite*	Medium	Yes	Implement rehabilitation strategy and rehabilitation interventions	*Moderate -*	*Long Term > 5 years*	*Site or Local*	Medium	*Possible*	Medium
Decommissioning and Closure																
Biodiversity	Encroachment of alien invasive plant species	Degradation of vegetation	*Moderate -*	*Medium Term > 18 months*	*Site or Local*	Medium	*Definite*	Medium	Yes	Implementation of alien invasive plant management plan	*Moderate -*	*Medium Term > 18 months*	*Site or Local*	Medium	*Unlikely*	Low

Affected Environment	Activity	Impact Description	BEFORE MITIGATION						Cumulative Impact	Mitigation measures / Recommendations	AFTER MITIGATION					
			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE			Magnitude	Duration	Spatial Scale	Consequence	Probability	SIGNIFICANCE
				< 5 years						needs to be continued during decommissioning to prevent the growth of invasive plants on rehabilitated areas; Rehabilitation of site with indigenous vegetation that occurs in the vicinity of project area.		*< 5 years*				
Biodiversity	Loss of species of conservation concern	Biodiversity loss	*Moderate -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Medium	*Definite*	Medium	Yes	All infrastructure that could have a negative impact on faunal species (powerlines etc) needs to be decommissioned and removed.	*Moderate -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Medium	*Unlikely*	Low
Biodiversity	Impact on the growth and health of both fauna and flora	Altered habitat	*Moderate -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Medium	*Definite*	Medium	No	Implement rehabilitation strategy and rehabilitation interventions	*Moderate -*	*Medium Term > 18 months < 5 years*	*Site or Local*	Medium	*Unlikely*	Low

11 Opinion of the Specialist

An impact statement is required as per the NEMA regulations with regards to the proposed development.

The impacts as described, rated and mitigated in this report pose a high to moderate negative risk to the ecology within the project area. The ecological sensitivity of the area is determined to be moderately sensitive. With firm adherence to all the mitigation measures prescribed in this report, the high risks have been rated as moderate.

It is the opinion of the specialist that the proposed project be authorised provided that all mitigation measures are implemented, and the following conditions be included in the environmental authorisation for this project:

11.1 Conditions for Environmental Authorisation

- An Environmental Control Officer (ECO) must be appointed and be present for the duration of mining period;
- A rehabilitation plan must be compiled and implemented for the for all phases of the project. The rehabilitation plan must make provision for the rehabilitation and/or remediation of wetland areas and include an action plan (emergencies) for environmental hazards.
- A biodiversity offset be conducted to offset the loss of biodiversity resulting from the proposed project activities.

12 Conclusion

The ecological assessment concludes that the majority of the project area remains largely natural, with ecosystems classified as Vulnerable (VU) due to their conservation importance and sensitivity to disturbance. The proposed aggregate mining activities are expected to result in moderate to low impacts on vegetation and low impacts on terrestrial fauna, primarily through habitat loss and species displacement.

However, through the application of targeted mitigation and management measures, all identified high-impact risks have been effectively reduced to moderate levels, with effects largely confined to the project footprint. These measures are aimed at minimizing habitat degradation, preserving ecological function, and ensuring that regional biodiversity is not significantly compromised.

Continued environmental monitoring and adherence to the recommended mitigation strategies will be essential to maintaining ecological integrity throughout the project lifecycle.

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